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was made by Professor Cousin, of Louvain, who found some bone implements, together with numbers of human bones. During a later visit more human bones, and a somewhat abundant quantity of wheat, were discovered in a stratum of angular flints. The wheat appeared to have been charred, and though it is decidedly smaller in size than our ordinary grain, the author does not hesitate to affirm that the material he has found is cultivated wheat. — *The Academy.*

ZOOLOGY.

THE SPIKE-HORNED MULEDEER.—My friend Mr. J. A. Allen, in a late number of the NATURALIST, calls in question the accuracy of my observation on an animal of the above character, believing that I have been deceived and have mistaken a two year old elk for a buck, *Cariacus macrotis.* Although I did not see the animal in the skin, my informants at Fort Hays were so well assured of its character that I accepted their statements. On a second inquiry of Dr. J. H. Janeway, Post Surgeon, he favored me with the following letter: —

"FORT HAYS, Kansas, Nov. 7, 1872.

Prof. E. D. COPE, *Philadelphia, Pa.* *My dear Sir:*—In regard to the spike-horns that I sent you, of which you so kindly acknowledged the receipt, and which seem to have caused some dispute as to their species: — I informed you that they were from a black tailed deer. Since then I have satisfied myself entirely that I was correct in the assertion. The buck was killed in company with a doe, about three miles southeast of this post and the meat was partaken of by my family and the families of other officers at the post and by patients in the hospital, and was recognized by all to be a "black tail deer." The skin, and especially the tail, were in possession of one of my sons for a long time and were known to him to belong to a black tail deer. No elk has been shot or seen at this post or this side of the Saline (over twelve miles distant, nearest point) inside of five years."

The association with a doe of the black-tailed species adds greatly to the probable correctness of the determination.

I have moreover examined a second example of spike-horn of this species, in possession of Mr. Prentice of Topeka, Kansas. The stuffed head which bears the horns belonged to a deer which was brought to the market in Leavenworth, Kansas, having been killed west of that city, towards the Republican river. The animal is evidently adult. The beam is twenty-two and one-fourth inches in length, fourteen inches in diameter at the base and separated three inches from its mate, at the base. It is thus not quite so long as the beam of the specimen first described. It differs moreover in possessing a peculiar curvature just beyond the point where the large anterior antler should have been given off (which exceeds the beam in *C. Virginianus*). The true beam is shortly sigmoidally twisted, and then pursues a more anterior direction than in the normal horn, or my spike-horn. The anterior antler is represented by a rudiment.—E. D. Cope.

Does the Pelican feed its young with its own Blood?—The supposed fable of the pelican feeding its young with its own blood may prove, after all, to have some foundation in fact, as a somewhat analogous circumstance has recently been observed in connection with the flamingo. A pair of these birds in the Zoological Gardens of London showed symptons of breeding, but laid no eggs. Some Cariamas, kept in the same aviary, have the habit of opening their mouths, bending back their heads and uttering a plaintive cry like young birds. In response to this, the flamingoes during the period referred to would frequently stand over the Cariamas and, with a gulp, raise up a reddish glutinous fluid from their throats and disgorge it over them, pouring it into their throats and even over their backs. This on examination proved to consist of blood corpuscles, in a glairy fluid, and mixed with crystals, supposed to be principally of salt. This, by Mr. Bartlett, the superintendent of the Gardens, is believed to be an addition to the usual food furnished by the parent flamingoes to their young, and perhaps analogous to the milky fluid supplied by pigeons under the same circumstances, and discharged from the thickened membrane of the crop.

A somewhat analogous, and still more curious, fact is furnished by the hornbill, an African bird with a huge bill, of which many species can be seen in our public museums. As is now known, the male bird is in the habit of walling up the female while seated on her nest in a hole of a tree, so as to imprison her completely, leaving only the head and neck exposed. He then fills his crop with fruit which becomes encased in a gelatinous envelope, secreted from its walls and the whole is then brought up in a mass and fed to the captive.— S. F. B.

Nest, Eggs and Breeding Habits of the Vermilion Flycatcher (*Pyrocephalus rubineus* var. *Mexicanus*).—This bird is a common summer resident of the southern portions of Arizona, where it arrives the latter part of March, or early in April, almost exclusively frequenting the wooded borders of streams. About the 20th of April the pairs begin to build their nest, which is placed on a fork of one of the smaller branches of a mezquite or cottonwood, usually ten to twenty feet from the ground. It is difficult to find on account of its small size, and is not easily preserved being a very shallow affair, and loosely constructed. One now lying before me is composed of a groundwork of tops of weeds and small dry willow twigs, to which are added a few small pieces of the soft inner bark of cottonwood, and some other plant fibres; the lining consists of fine hair and pigeon feathers. The eggs are usually three in number; at least, I have never found more. They are of a very pale cream color, spotted and blotched with the shades of umber brown and lilac, the spots in most cases forming a ring round the larger end, though sometimes pretty evenly distributed over the whole surface; and in such cases the markings are usually smaller and paler. The dimensions of a set are as follows:—.70 by .51; .69 by .53; .68 by .52. The largest one of four sets measures .72 by .52; the smallest, .66 by. 53. The period of incubation is about two weeks; the male does not appear to take part in it. At least two broods are reared each season. The male is very noisy at this time, hovering in the air in the manner of a sparrow-hawk if he observes any unwelcome intruder near his nest; when much excited resembling a miniature turkey-gobbler, and presenting a comical appearance with his crest erect, every feather ruffled out, and his tail at right angles with his body, seemingly having hard work to keep his balance. Whilst on wing at such times he continually utters a shrill cry of alarm, something like the syllables "*ze-bri, ze-bri*" quickly repeated. On leaving the nest, the young are of a uniform ashy gray color. About the end of September the bird leaves for its winter home in Mexico.—LT. CHAS. BENDIRE, U. S. A., *Tucson, Arizona.—Communicated by Dr. Coues.*

DISTRIBUTION OF THE HELICIDÆ IN THE SANDWICH ISLANDS.—Mr. John T. Gulick has contributed to a recent number of "Nature," a very interesting and valuable addition to our knowledge of the geographical distribution and variation of species, in an account of the section of Helicidæ, known as Achatinellinæ, found in the Sandwich Islands. The family, of which the common snail is an example; is quite peculiar to this group of islands, and is characterized by the columella having a spiral twist, giving it the appearance of being armed with a lamellated tooth revolving within the shell. The singular fact is that most of the genera and all the species are restricted, not only to a single island, but to a very small area in the islands. In Oahu, an island sixty miles long and fifteen broad, there is the extraordinary number of one hundred and eighty-five species of Achatinellinæ, none of them (with scarcely an exception) found on any other of the islands and no species occupying a large proportion even of this area. Most of the species are confined to the forests of mountain regions; and where, as on Oahu and Maui, there are two regions of forests divided by several miles of grass country, the island is also divided into two sections, having but few, if any, species in common. On the island of Oahu, the two sections which occupy separate mountain ranges are divided into many minor sections in the following manner. From each side of the main range project mountain ranges, which separate deep valleys a mile or two in width. Each of these valleys is a subordinate section, having its own varieties, and, in many instances its own species, which are nowhere else. Nearly all the species of one genus, found on one mountain range, are connected by varieties presenting very minute gradations of form and color. Species of the same genus on different islands are not so completely connected by intermediate forms. The family is divided into two natural groups of genera. The first group consists of seven genera,—Achatinella, Bulimella, Helicterella, Portulina, Newcombia, Laminella and Auriculella; these are all arboreal in their habits, and are either sinistral, or both dextral and sinistral. The second group consists of three genera,—Amastra, Leptachatina and Carelia; these mostly live on the ground, and are dextral. Granting the hypothesis of evolution, Mr. Gulick is quite unable to account for these singular facts, and many others enumerated in his highly interesting paper, on the theory of the Survival of the Fittest, or any other theory that has yet been brought forward.—A. W. B.

HARLAN'S HAWK AND THE MEXICAN CORMORANT.—Prof. Baird having expressed a desire to see the specimens designated in my "Catalogue of the Birds of Kansas" as "Harlan's Hawk" and the "Florida Cormorant," I sent them to him for examination. Mr.

Ridgway writes that "the Buteo is really *B. Harlani* and in a plumage not seen before." A description of this bird will be found in his monograph of the North American Raptores soon to be published. Of the Cormorant, he says that it "is not *Graculus Floridanus* but *G. Mexicanus!* — the first specimen obtained north of the Rio Grande!" This bird was taken four miles south of Lawrence, April 2d, 1872. My mistake in the determination of the species arose from the lack of other specimens with which to make comparison, and from the fact that the measurements of this single specimen exceeded those given in Baird's General Report, the stretch of wings, for instance, being full six inches greater. — FRANK H. SNOW, *Lawrence, Kansas, July* 5th, 1872.

NOTE ON THE DATES OF SOME OF PROFESSOR COPE'S RECENT PAPERS.—The "Proceedings of the American Philosophical Society," vol. xii, No. 89, just issued (February 6, 1873), contain several communications by Professor Cope on Vertebrate Fossils from Wyoming. There are several errors in the dates of these papers, bearing in the same direction as those which I have already pointed out, but fortunately many of these can readily be corrected. In the table of contents of this number, under the stated meeting, August 15, 1872, eight papers by Professor Cope are enumerated; and it might be inferred that they were read on that day. In fact, however, there was no meeting of the Society on the 15th, the regular August meeting having been held Friday, August 16th, at which three only of these papers were read by title, or entered on the records. At the next regular meeting, September 20, 1872, five papers by Professor Cope were announced, or read by title. But as now published in the "Proceedings," four of these purport to have been read September 19, 1872, when no meeting was held on that date. The actual publication of these papers, by distribution, is of course a distinct matter, and the evidence is conclusive that none of them were so published before October 29, 1872, and some of them not until long after.—O. C. MARSH.

THE SOUND PRODUCED BY THE DEATH'S HEAD MOTH.—Mr. H. N. Mosely has been investigating the cause of the peculiar cry produced by the Death's Head Moth, *Acherontia atropos*, and records the result in "Nature." A number of treatises have been written on the subject, from the time of Réaumur in 1734, the various writers attributing it to friction between the abdomen and thorax, the expiration of air through the proboscis, special organs attached to the abdomen, vibrations of the thoracic rings, and vibrations of the wings in rapid motion. A very complete and ingenious series of experiments conducted by Mr. Mosely seem to place beyond doubt the conclusion that the sound is produced by the proboscis, the note being formed at a narrow slit-like opening at the base of the trunk, and being modified by passage through the proboscis, and by vibrations therein set up.—A. W. B.

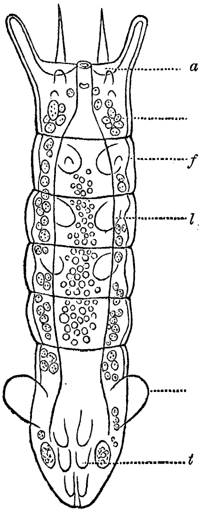
Mode of Increase of the Long Bones.—A paper on this subject appears in the last part of the *Archives de Physiologie*, by MM. Philippeaux and Vulpian. The views generally adopted in regard to the mode of growth of the long bones, both in length and diameter, have been called in question by Wolff and Volkmann in papers recently published; and MM. Philippeaux and Vulpian's researches were undertaken with the object of ascertaining whether their objections are well founded. The doctrine, supported by the authority of Duhamel, Hunter, and Flourens, and generally accepted, is that the long bones increase in length by additions to the extremities in the form of new layers between the shaft or diaphysis and the articular portion or epiphysis, while they become broader by the deposition of new bone in the periosteum on the outer surface of the bone. M. Wolff, on the other hand, maintains that the growth of bone is interstitial, and that each part of the bone takes part in the enlargement. He points to the persistence, during growth, of the position and relations of the peculiar and geometrically arranged trabeculæ of the cancellous texture constituting the head of the bone, which could hardly occur on Duhamel's theory. He denies Duhamel's statement that a ring surrounding the bone of a young animal comes by degrees to occupy the shaft of the bone, owing to absorption of the old bone and the superposition of new; but contends that the old bone is pressed inwards, and is certainly not absorbed. He further states that when wires are passed through both the epiphysis and two points of the diaphysis, the distance between the two latter augments just as much as the distance between the wire passing through the epiphysis and that through the diaphysis lying nearest to it. MM. Philippeaux and Vulpian oppose M. Wolff's statements. They state that rings encircling the bone, as well as metallic lamellæ, interposed between the periosteum and osseous tissue in young animals, do actually cut their way till they are free, or almost free, in the medullary cavity; and they refer to specimens made by themselves in Flourens' laboratory, and now in the Musée Dupuytren, in confirmation of their theory. As regards the separation of metallic threads drilled into the bone, they think that in Wolff's experiments the two wires passed into the shaft of the bone were too near the epiphysis to furnish any satisfactory result. Finally, they give the details of a series of experiments conducted under Flourens' direction, in which madder was given to young pigs up to a certain period, when one of the litter was killed, and its bones prepared as objects of comparison with those of the rest, which were killed afterwards at stated intervals up to eighteen months. The bones of these animals, they declare, clearly demonstrate the correctness of the old doctrine, and prove irrefragably that all increase in diameter is due to fresh subperiostitic deposits, whilst all increase in length is caused by the progressive ossification of the osteological elements supplied by the cartilage of conjugation between the diaphysis and the epiphysis. Moreover their experiments incidentally showed that the long bones increase in length more at one extremity (the upper or proximal) than at the other.—*The Academy.*

MEADOW LARK WITH FOUR LEGS.—I have a Meadow lark (*Sturnella magna*), more than half grown, which possesses four legs. It lived about a week after capture, and for a time made use of all four. The extra or hinder pair is a little shorter than the front, and slenderer. One of them has all the toes well formed; the other has three delicate front toes, and instead of a hind one, a small appendage half way up the tarsus. Their femurs are attached to the end of the coccyx. This necessitated a one-sided position of the tail. There are two cloacæ, one on each side of the rump. This proves, as Vrolik has remarked, that in heteradelphs there are always the rudiments of two bodies. The front pair of legs, the wings, and all other parts are well developed.—JAMES ORTON.

WHEN IS SEX DETERMINED?—The interesting and able essay of Mrs. Treat that we give our readers in this number contains some interesting facts which are supposed by her to bear on this matter. We may, however, give some data which tend to show that the sex of the future insect, and probably of all animals, that reproduce by eggs, is determined at or about the time of conception or at least early in the embryonic state.

"Herold* it was, says Weismann, in his great work on the 'Development of the Diptera,' who first showed as regards the Lepidoptera that even in the egg, the germ of the sexual glands was formed, and when indeed the difference between the sexes is easily perceived. In the flies the same holds good, though indeed the differences between the germs of the female and male sexual glands are less striking to the eye. . . . . That the sexual glands are formed in the egg results from their position in the midst of the fatty body, when they are cut off from any connection with parts to which they could owe their origin. The youngest larva in which I saw them was a centimetre (about four-tenths of an inch) long, and about five days old. With much expense of time it would be plainly possible to discover them even in the larva freshly excluded from the egg." (Die Entwicklung der Dipteren, p. 133.)

Fig. 33.



We may also cite the case of the larva of Polynema figured by Ganin (see this journal, vol. v. pp. 47, 48). As seen in the adjoining cut (Fig. 33) the rudiments (imaginal disks, *t*) of the ovipositor of the female are indicated at the same time as those of the legs (*l*) and wings(*f*) of the adult ichneumon fly.

In Platygaster, Ganin says, "the earliest indication of the sexual glands appears, as we shall see below, during the time when the first larval form passes into the second. With the first indication of the ovary that of the seminal glands agrees in all its relations. Both appear as small roundish structures arising out of the embryonal cells. For a long time (in the course of all the larval stages) these germs of the sexual organs remain in an unorganized state." It should be remembered, however, that the first larval stage of this egg-parasite which lives in the body of the larvæ of all gall flies (Cecidomyia) is not a true larva in the usual sense of the word, like that of the fly; it is an embryo set loose from the egg with organs not homologous with those of the fully formed larva, having no organs of respiration (tracheæ), no completely organized alimentary canal, nor any vascular system. When compared with the freshly hatched larva of the fly or bee, it represents an early embryonic stage of the latter, and thus we feel warranted in supposing that in the bee, the difference between the sexes appears early in its embryonic life.

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*Entwicklungsgeschichte der Schmetterlinge, 1815.

In these cases we may observe that the external surroundings and food of the larva seem to be identical.

In the larva of the humble bee when about half grown, if our memory is not at fault, we have observed the rudiments of the ovipositor of the female, and the corresponding external male organs. In the fully grown larva they are easily seen.

In forming an opinion on this question, it should be borne in mind that the sex of the honey bee is decided at the time the egg is laid, as it is well known that the unfertilized eggs of the queen produce females (workers and queens), while the eggs destined to hatch drones are fertilized by the queen *at her will*, since she relaxes the muscles guarding the opening of the spermatheca, allowing the spermatozoa to escape and impregnate the egg when she wishes to lay a drone egg. Thus from the researches of Dzierzon and von Siebold, it is a matter of fact that the sex of the honey bee is decided at the time the egg leaves the oviduct.

How early sex is determined in other classes of the animal kingdom would be a most interesting subject of investigation. We believe that the subject has been the most thoroughly discussed by those who have studied the embryology of insects. In man the sexes can be distinguished towards the end of the second month of fœtal life, according to Kölliker.* — A. S. P.

A New Species of Butterfly from Florida. — Key West abounds in lepidopterous insects even in winter. The southern section of the island is covered with luxuriant vegetation, among which spots have been cleared for plantations. Many of these have been abandoned and allowed to grow up to weeds and shrubs which are generally covered with flowers. These old fields are, on this account, the favorite resort of many butterflies and I have caught several species there in a few moments.

The shores are also open and many flowering plants may be found there. An immense number of butterflies are always hovering over them during the day, and towards evening they all collect on the shrubs, or small trees, in groups of from ten to fifty. They will select the leeward side of the tree and alighting upon the leaves hang wings downwards; remaining in this position if undisturbed through the night. They are exceedingly stupid when thus roosting and I have taken as many as thirty with a single sweep of my net. Each group will be composed of a single species, but there are three kinds which usually gather in this manner, viz: — *Danais berenice*, *Agraulis vanillæ* and *Pieris monusta*.

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* Entwicklungsgeschichte des Menschen und der hoheren Thiere. 1861.

The paths through the scrub are good collecting grounds for the smaller ones (*Thecla*, *Lycæna*, etc.), and I captured many of them. Among these I found a species of Lycæna which I think undescribed. It is of plain color and retiring habit, frequenting the edges of the bushes, generally keeping in the shade of the foliage. On this account I propose to name it the modest Lycæna (*Lycæna modesta*). The following is a description of this butterfly.

Above ashy-brown; darkest on the outer edges of the primaries, and becoming pearly on the secondaries. There are two triangular spots of black on the outer margins of the latter, and indications of a third. These are preceded on the outer edge by a band of black, which is slightly margined with white. Tail black. Under side ashy with a band of nearly confluent spots near the outer edges, which are edged with white on the outer sides. There is a narrow black line on the margin of the wings, preceded by ashy. Between the bar and line there are a few dusky triangles. also a few dusky spots near the costal border. A few black spots edged with white on the secondaries near the body. These are preceded by a bar of partly confluent black spots, margined on the outer side with white. Then come two bars of dusky spots edged with white on the inner side. The wing is terminated with an ashy line, which is preceded by a bar of black, edged on the inner side with white. There is a crescent of red near the middle of the outer side which encloses a black spot. On the lower angle is a black spot preceded with reddish. Body ashy; antennæ black, tipped with reddish-brown. Expands about one inch. — C. J. MAYNARD.

THE RIBBON SEAL OF ALASKA. — This species of seal (*Phoca fasciata* Shaw or *P. equestris* Pallas) is found in the waters of northern Alaska, and is, so far as known, only represented well in the museum of St. Petersburg. In the Smithsonian collection, there are two skins, obtained by Dr. Dall from Cape Romanzoff, but no skull or other parts of the skeleton. The species is remarkable for color as well as for structural peculiarities. The male is at once recognizable by the color; this may be said to be a chocolate-brown except (1) a band of whitish-yellow, bent forwards towards the crown around the neck (2) an oval ring of the same color on each side, encircling the fore feet, and passing in front just before them, and (3) another band, also bent forwards above, behind the middle of the trunk. There is considerable variation in the extent of these bands, and sometimes the peribrachial rings are more or less confluent with the posterior band. The females are simply whitish-yellow, or have very indistinct traces of the postmedian band (fide Von Schrenck).

The structural (and especially dental) characters of this species, according to Von Schrenck, indicate a generic distinction from all the familiar forms of the subfamily *Phocinæ*. The molars (except the first) are two-rooted as in the typical *Phocinæ*, but in external form are simply conic or have rudimentary cusps, thus resembling Halichœrus. The genus may be named *Histriophoca.*

The special object of this communication is to call the attention of travellers in Alaska to the species, and skeletons (especially skulls) and skins are earnestly asked for. The species has been found also in Kamtschatka, and at the mouth of the Kamtschatka river in March and April, arriving there later than the other seals named.

One of the skins in the Smithsonian collection has been peeled off from the animal almost entire, and by a cross slit below and between the fore feet, and, being tied in front, has evidently been used as a bag. — T. GILL.

GEOLOGY.

FOSSIL QUADRUMANA IN THE EOCENE OF WYOMING. — An examination of more complete specimens of some of the extinct mammals already described by the writer from the Eocene deposits of the Rocky Mountain region, clearly indicate that among them are several representatives of the lower Quadrumana. Although these remains differ widely from all known forms of that group, their more important characters show that they should be placed with